

Factors Affecting Coffee (*Coffea Arabica* L.) Quality in Ethiopia: A Review

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Abstract: Coffee (*Coffea arabica* L.) is the most significant crop and is consumed all over the world. Twenty-five percent of Ethiopia's population is dependent on the coffee business. Coffee quality can be affected by a variety of factors, including genetic and environmental factors, as well as the level of care given from the field to the bloodletting. On those factors, various studies have been conducted. As a result, this review aims to find out the elements that influence coffee quality in Ethiopia, as well as the analysis gap in coffee quality. Cup quality is also a fancy attribute that is influenced by several elements such as genetics, ecology, cultivation, processing method systems, and storage conditions. One of the most important stages in the preparation of any agricultural product, including coffee, is storage. The quality of coffee is affected by post-harvest operations and the plant's structure. Every stakeholder, including farmers' awareness, has played a part in Ethiopia's intriguing coffee quality.

Keywords: Beans, Coffee, Ethiopia, Factors, Quality

1. Introduction

Coffee (*Coffea* L.) is that the arena's favorite drinkable and for that reason the second-maximum indexed alternate things whereas oil [1]. Entirely two species notably arabica (*Coffea arabica* L.) and robusta (*Coffea canephora*) are beneath business cultivation [2, 3]. coffee is grownup in further than eighty countries in tropical and semi tropic regions of the planet and exported in varied forms parenthetically green or roast beans to quite 165 countries [4, 5] and 0.5 the world people take it in lifestyle methodology that quite four hundred billion cups of coffee are consumed associate rally, that's exported from developing nations, besides Ethiopia nation, [6] on be the foremost offer of foreign currency earnings [7, 14]. Ethiopia is that the center of origin for Arabica coffee [14] and ranks fifth within the world where the contribution is concerning 4.2% to the planet coffee market [6, 9]. Its production is an increasing trend wherever the present production is denumerable to be concerning 449,229.8 tons with the productivity of 0.612 t ha⁻¹ clean coffee [8]. Coffee further plays a major role in sustaining the livelihoods of quite fifteen million households inside the country [10]. In recent years, coffee production within the

region is increasing from time to time. Even though, there are growing demands for high-quality coffee within the international market today. This has given coffee-producing countries associate impetus to increase the quality furthermore thanks to the number of coffee they manufacture [11]. The quality of coffee is powerfully influenced by environmental factors including, altitude, shade, daily temperature fluctuations, amount, and distribution of downfall conjointly because of the physical and chemical properties of soil [12]. Moreover, the genetic make-up of genotype also influences the quality of coffee beans [13]. Throughout this regard, Yigzaw [14] and Leroy [15] rumored that genetic origins might influence the coffee quality by poignant genes of chemical compounds and aroma precursors that are expressed throughout the coffee-making process. coffee production conditions, also as postharvest operations, like fruit selection, processing, drying, and storage conditions, can influence the standard of coffee beans [16]. The physical characteristics and chemical composition of coffee are influenced by a spread of things, also as genetic, environmental, and process factors, and crop management, gathering, and preparation. aside from the genetic and environmental factors, these factors are usually controlled,

not entirely via field management but additionally by adopting smart agricultural practices, once crop implantation, when all the problem goes towards maximizing quality and at intervals, the coffee gathering phase, throughout that the preservation of quality is sought-after [13]. However, some info is out there, however, there' no comprehensive investigation adds Ethiopia nation regarding the results of environmental factors like altitude shading, and method ways that [17-20] on the quality and chemical science composition of inexperienced occasional beans. This disadvantage has forced efforts to be created at intervals in the country and to take advantage of the growing demands for quality coffees inside the international market. Therefore, this review addresses factors influencing the coffee quality and proper processing methods of coffee Arabica in Ethiopia.

2. Coffee Quality

Quality may be a trait tough to define. The world organization for Standardization (ISO) describes quality as the ability of a group of inherent characteristics of a product, system, or process to satisfy the need of consumers and other interested parties (ISO, 2000). These inherent characteristics are often called 'attributes' [21]. For coffee, the definition of quality and so the attributes thought of have presumptively evolved through the centuries. The ISO (2004a) written a typical for inexperienced coffee quality (ISO 9116 standard) [22]. It desires many things of data, barely similar to the geographical and biological science origins of the coffee, the harvest year, the wet content, the overall defects, the proportion of insect-damaged beans, thus} the bean size. These ISO standards outline ways in which of activity for many of these qualities: defects, status content, bean size, chemical compounds, and preparation of a sample to perform cup tasting. Therefore, coffee quality is firm to stipulate and agree on as a result of the definition of quality varies for varied neutrals across the object (production-to-consumer) chain. This implies what one neutral perceives as quality might not be so thought of by another.

- 1) At the farmer level: coffee quality might even be a mix of production level, price, and easiness of culture;
- 2) At the capitalist or bourgeois level: occasional quality is coupled to bean size, lack of defects, regularity of provisioning, tariff available, physical characteristics, and price;
- 3) At the roaster level: occasional quality depends on wet content, stability of the characteristics, origin, price, chemistry compounds, and organoleptic quality. It has to be compelled to be noted that every shopper market or country might outline its organoleptic qualities;
- 4) At the client level: coffee quality deals with price, taste, and flavor, effects on health associated alertness, geographical origin, environmental associate degreed science aspects (organic occasional, honest trade, etc.).

It's a joint effort by all the key players of the coffee production-to-consumer chain [23]. Per Neilson [24], quality is embodied not alone stylish and/or physical attributes

however put together through an over-plus of social, environmental, ethical, safety, and different concerns.

2.1. Coffee Quality in Ethiopia

Accordingly, utterly different authors were according as different analysis activities have an impression on coffee quality in some ways. Cup quality is, in addition, a rhetorical character that depends on a series of things barely similar to the species of choice (genetic factors), environmental conditions (ecological factors), science practices (cultivation factors), methodology systems (post-harvest factors), storage conditions, industrial processing, and preparation of the nutrient and magnificence of the patron occasional quality is of crucial importance to the low industry. Quality coffee might be additionally a product that has fascinating characteristics' form of a clean raw and roast appearance, partaking aroma, and good cup vogue [26]. However, at intervals in the African country, the standard of coffee created by farmers has been deteriorating from time to time [19]. African nation encompasses a particular position with relation to the Arabica low world as a result of its birthplace or origin of *C. arabica* and put together the natural conditions for coffee growing are nearly ideal in African countries [27]. It's hypothesized that the foremost factors that have an impression on the standard of intractable Arabica occasional (*Coffea arabica* L.) from the natural coffee forest ecosystems are distinct since these natural coffee forests are the origin of Arabica coffee and are found entirely in Ethiopia nation (not in numerous countries like Brazil, Vietnam, Colombia, etc.) [28]. Moreover, factors that verify coffee quality are genotypes, climate, and soil characteristics of the world, science practices, gathering within which} and timing, post-harvest methodology techniques, grading, packing, storage conditions, and transporting, all contribute to either exaltation or deterioration of coffee [26]. However, the impact of genotypes on quality differs supported the ecological conditions where the plant grows. Hence, due attention should be compelled to tend to genotype-by-environment interaction throughout breeding in ways that boost coffee quality [19]. Furthermore, inadequate systems of harvesting, processing, storage, and transportation are in charge of the widespread failure as would love to look once the inherent quality of coffee is created in Ethiopia countries [29].

2.2. Genetic Factors

Coffee belongs to the genus *Coffea* with inside the Rubiaceae own circle of relatives and nearly all of the coffee species are diploid ($2n = 2x = 22$) and usually self-incompatible besides *C. Arabica* that is a herbal allotetraploid ($2n = 4x = 44$) self-fertile species [30].

As harvesting method, post-harvest procedures, and consequently the body structure of the plant itself affect coffee quality, its genetic origin (species and genotype) additionally substantially have an impact on coffee quality [15]. Several studies have additionally proven that the genetic range of Arabica coffee is coffee in comparison thereto of robusta coffee [31, 32]. Large variations in

chemical composition are frequently additionally discovered among those species main to essential variations in beverage quality. A massive variant additionally exists in the species. The lifestyles of an extensive range for quality developments of Ethiopian Arabica coffee genotypes have been mentioned elsewhere [18, 33].

According to Agwanda [34] comparison 4 developments (acidity, body, and taste) and common general for their suitability as choice standards for the genetic development of common liquor quality steady with the author, supported correlation, repeatability, and sensitivity analysis, taste score changed into endorsed due to the quality choice criterion for genetic development of cup quality in Arabica coffee. The trait confirmed an excessive genetic correlation with preference, changed into clean to exercise session organoleptically, and had incredibly excessive sensitivity in discriminating distinct coffee genotypes.

The observation of Yigzaw [14] additionally found out that coffee quality relies upon genetic makeup and genes manipulate the manufacturing of chemicals that behave as aroma dealers both at once or as aroma precursors expressed throughout the roasting process. Hence at the same time as deciding on a cultivar to be planted; cup quality should be the concern to be considered. Furthermore, Moreno et al. [25] progressed the cup coffee of various coffee genotypes with the help of expert coffee tasters. Both researchers determined near similarity amongst liquors in rating diverse cup quality traits of the cultivars, indicating that everyone panel may want to have depended on choice for cup quality.

Similarly, Agwanda et al. [35] mentioned massive genotype x environment interaction consequences on coffee beans and liquor quality. Walyaro [36] mentioned incredibly decrease genotype x environment interaction consequences on quality characters. On the contrary, Van der Vossen [37] mentioned non-massive genotype x environment interaction consequences on quality characters, inclusive of bean length and cup quality.

Selvakumar and Sreenivasan [38] determined coffee cup quality variant starting from top to wonderful amongst fifty-four Arabica coffee accessions accrued from Kaffa, Ethiopia. The genotype is a key element because it determines to a first-rate quantity critical traits inclusive of the dimensions and form of the beans in addition to their color, chemical composition, and taste [39]. The form and shape of beans (elephant, pea bean, and empty beans) are the results of each genotype and environmental element [39]. For enhancing the coffee quality and meet marketplace demands, interest has been given to exploring genetic and environmental elements in addition to agronomic and different coffee control practices [11]. Since the beginning of the coffee studies in Ethiopia in the 1970s [40 - 42], widespread development has been made with the aid of using the countrywide coffee breeding program, Jimma Agricultural Research Center (JARC) has launched 26 coffee varieties (23 pure lines and 3 hybrids), which can be high yielding, diseases resistant, and own specific inherent quality attributes of each locality [43]. This indicates that there's a big capacity aid for enhancing

espresso bean characteristics thru breeding [19], and the effect of genotypes on quality differs primarily based totally on the ecological situations wherein the plant grows. Hence, due interest ought to receive to genotype with the aid of using surroundings interplay throughout breeding techniques to enhance coffee quality.

2.3. Climatic and Soil Factors

The plantation crops like coffee, tea, and rubber have completely different agro-climatic requirements and are cultivated in varied soil kinds [43]. Associate economical depth of larger than one hundred fifty cm permits the coffee plant to want the advantage of a larger volume of soil for nutrients and water. Extraordinarily applicable areas are those with high soil organic matter (SOM) (> 3%) content and slightly acidic soils (between hydrogen ion concentrations 5.3 and 6.5) [44]. The majority of coffee soils in Ethiopia country are classified as Nitosols, which are extremely weathered, originated from volcanic rocks, are deep, well-drained, and have medium to high contents of most of the essential elements, except matter and phosphors [44]. The physical setting in conjunction with the soil is one of the foremost important factors that influence coffee quality [39, 45]. Altitude, daily temperature fluctuations, amount and distribution of rainfall, and therefore the physical and chemical characteristics of the soil are important factors. Climate, altitude, and shade play a significant role through temperature, the convenience of sunshine, and water throughout the ripening quantity [12]. Downfall and sunshine distributions have a durable influence on flowering, bean expansion, and ripening in line with temperature is that the foremost important element, that affects coffee berry quality [46]. The higher the temperature, the upper the metabolic activity of the seed. Coffee with condition content as coffee as 11% loss its quality once 0.5 a dozen months at a lower place with a temperature of 35°C. On the choice hand, a coffee with wet content over V-day will maintain its quality at a temperature as low as 10°C. Coffee has got to be maintained at low temperatures to chop back its metabolism and respiration. In Ethiopia, coffee isn't entirely created in natural forests where it originated but collectively it's increasing to different regions that have full sun to partial shade environments. Taye [47] researched to work out the standing of soil nutrient elements, and characterize the soils on which coffee is full-grown. The metal composition of coffee berry variations owing to their variations in geographical origin was collectively rumored by Abera [48]. Yigzaw [14] reported that coffee fully grown with an important application of matter fertilizer had poorer, lighter, and thinner quality than that from unfruitful fields. Associate nitrogen can increase the alkaloid content, resulting in tons of bitter types of the brew. The caffeine and chlorogenic acid contents of the beans aren't sick with the amount of phosphorus, element, potassium, and gilded element at intervals within the soil [39]. In his study, chemical element and phosphorous were negatively involving coffee quality. Additionally, metallic elements are negatively related to the

quality of coffee. Soil hydrogen ion concentration was noted to indirectly accompany the character and acidity of coffee. Abebe et al. [28] rumored inverse relationships between cup quality and soil nitrogen to phosphorus quantitative relation and soil Zn content at Shako. The authors collectively found direct associations between cup quality with soil K, Ca, CEC, pH, and micronutrients at Yayo forest coffee in Ethiopia. Abera [48] analyzed the metal contents (Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Ni, Pb, and Zn) of raw and roast low beans obtained from five utterly completely different components of Ethiopia (Wollega, Sidamo, Harar, Bench-Maji and Kaffa zones), and settled that the discovered the metal concentrations in cooked coffee beans were relatively over their corresponding raw coffee samples. Associate absence of Zn will cause the assembly of very little light-weight grey-colored beans, which can manufacture poor liquor [39]. On the other hand, element deficiency hurts cup quality. A high concentration of metallic element ($>0.11\%$) and metallic element ($>1.75\%$) at intervals the beans are regarding a bitter and “hard” vogue [39]. online with Mekonen's [48] report, caliber is usually sick with climatic and soil factors. In addition, total quality, body, and type were directly involving soil pH. Apart from pH, Mg, and Ca, the choice soil properties were negatively related to total coffee quality. Overall, the soil matter content is reciprocally related to most coffee attributes. The findings are quite in line with that of Yadessa and Wintegens [28, 39].

2.4. Altitude Effect

Altitude is one of all the environmental factors that associate results on coffee berry quality through optimizing temperature [12, 49, 50]. Temperature plays a crucial role within the phonological cycle of coffee, considerably in fruit development and ripening [51]. The right temperature for arabica coffee is between $18-21^{\circ}\text{C}$ [52] and coffee beans that are grown up outside of those limits will have incomplete fruit maturation [53]. As an example, at a lower altitude where the temperature is on so many facets of the optimum ranges, fruit ripening is accelerated succeeding in bean quality losses [54, 55]. Once temperatures are high throughout the growing period, some chemical science compounds for instance butan-1, 3-diol, accumulate throughout the splitting and reduces the bean quality [56]. It's been rumored that altitude had a positive influence on the ultimate word nutrient quality of the occasional [57-59]. This could be actually because absolutely the best altitude generates a further best temperature for ideal cherry ripening that plays a crucial role within the event of attributes conferring superior quality [13, 60]. Lower temperature prolongs the maturation quantity of coffee beans. This provides an honest time for chemical synthesis [61]. Different similar studies additionally reported influences on daily temperature on bean chemical science compounds (such as CGA composition) of coffee seeds at maturity [62]. The study counseled that temperature may well be a key environmental parameter that directly affects the synthesis of coffee berry organic chemistry

compositions. the number of chlorogenic acids, caffeine, and plant material enlarged with altitude pleasantly fruity character and intense flavor is obtained at over at lower altitude [57, 58]. However, in Bertrand et al. [58], chlorogenic content varied across altitude ranges to illustrate enhanced from 900m -1350 m but attenuated from 1400-1450m. In different studies for instance Link et al. [56], chlorogenic acid content reduced with altitude however the alkaloid content increased. on the alternative hand, Sridevi and Parvatam [63], rumored the negative results of altitude on caffeine content. The study schooled that temperature might even be a key environmental parameter that directly affects the biogenesis of coffee berry chemical science compositions. the quantity of chlorogenic acids, alkaloid, and plant merchandise increased with altitude pleasantly fruity character and intense flavor is obtained at on {top of over more than beyond} at lower altitude [57, 58]. In Ethiopia, coffee grows at varying altitudes, starting from 550 to 2,750 m on top of water level. However, Arabica best thrives and is formed between altitudes of 1,300 and 1,800 masl, annual rain quantities ranging from 1,500 to 2,500 metric linear units with ideal minimum and most air temperature of fifteen and 30°C , severally MOA, [64]. Despite very high variability and so the sizable quantity of sorts discharged among the country most of the farmers still pattern their landraces. Moreover, formally free varieties are location-specific. The everyday inexperienced coffee berry yield per unit once a year is 0.7 t ha^{-1} that is bay such a lot below the planet average and thus the common of Brazil 0.8 and 1.3 t ha^{-1} , severally [65]. In addition, poor management practices, low soil fertility, and poor analysis are thought of as major constraints of coffee production. Climate changes are expected to deeply influence the population dynamics and so the standing of agricultural insect pests and diseases development. the rise in temperature choices contains a powerful and direct influence on insect development, reproduction, and survival [66].

2.5. Shade Effect

The coffee is big chiefly in association with trees that provide shade and different services [67]. A tree inside the coffee production system provides economic and ecological blessings [68]. Some studies showed that coffee shade trees play important roles in soil fertility management [69], selection conservation, carbon sequestration [70], and gain generation.

Shade is besides found to favor a property production of high coffee quality, notably below suboptimal conditions where temperatures are beyond optimum [53, 54]. Shade, in addition, reduces biyearly bearing pattern and immodest i.e. a bent to supply large fruit lots in one year followed by coffee production among consecutive years because of competition for photoassimilates between coffee berries and developing young branch elements [71].

In addition, shade creates additional favorable microclimatic conditions for coffee growth via lowering the

temperature of up to 4°C below sub-optimal conditions of low altitude (< 700> 1100 m) [53]. It's in addition been counseled that coffee trees massive below shade trees bear slower and extra uniform ripening. This permits the fruits to be developed in a very additional balanced manner giving sensible quality [54]. in several studies, for instance, Vaast et al. [53], shade level up to 40% fully affected bean composition associated nutrient quality by delaying berry flesh ripening by up to a minimum of 1 month. In different studies for example Bosselmann et al. [59] shade was, however, reported to wreck coffee quality attributes like acidity, body, and overall cup preferences. In distinction to the current study, Avelino et al. [58] discovered variations in cup quality and chemical compositions between coffees that end up below open sun and shade trees.

Some studies have indicated that shade reduces temperature stress among the quilt and elongates the maturation quantity of coffee berries. It in addition reduces periodic over-bearing and a subsequent die-back of coffee plants [72]. In line with this, Läderach et al. [45] reportable that coffee quality scores increase with the extent of shading. Bosselmann et al., [59] on the choice hand, reportable that, at high altitude, the shade had no important impact on cup quality attributes. At lower altitudes, however, shade reduced the amount of little beans with no important result on coffee sensory attributes. Throughout a study by Lara-Estrada and Vaast, [45] shade was reportable to not have any vital influence on coffee organoleptic properties beneath any of the conditions of altitude and fertilization. These contradicting reports show that optimum shade management practices are very site-specific and in addition that further studies are required to purpose its influence on coffee quality attributes across fully different elevation gradients. In Ethiopia, coffee trees are adult below the shade of variable levels and shade management is among the dominant science practices in ancient organic coffee growing systems [73, 74]. Recent studies show that shade significantly affects yield [47] and cup quality attributes of Ethiopian coffee [75, 76].

2.6. Pre and Post-Harvesting

Processes once harvesting, fruits bear primary process generate inexperienced coffee beans to provide green coffee beans, there are 2 unremarkably applied strategies of coffee cherry processing, dry and washed possessing methods. Each method takes away the outer layers of coffee cherries and cuts back the wet content within the coffee beans to concerning ten-twelve percent [76].

2.7. Dry Process (Unwashed or Sun-Dried)

Coffee cherries are leading sundried on mats, concrete, or cement floors in layers of roughly 10 cm [78]. The dried coffee cherries are de-husked employing a coffee hulling machine and inexperienced beans are prepared for market. For low to dry, this method will happen many days to a couple of weeks, counting on environmental condition

conditions.

2.8. Washed (Wet Coffee)

The handpicked red ripe coffee cherries are automatically de-husked and a fermentation process is administrated for roughly 24-72 hrs (variable on the climatic condition) to get rid of the mucilage covering the coffee beans [13]. Once washing, the coffee beans are preserved on raised beds. Within the process, coffee drying happens quickly as a result of there's no skin or mucilage present. The dried beans with parchment are de-husked employing a low hulling machine to get inexperienced coffee beans.

2.8.1. Semi-Washed

Recently introduced to coffee-producing countries. during this technique, the fermentation method is omitted and therefore the mucilage is removed by a de-mucilage machine. This method is understood for simplicity and improved water potency compared to full washed coffee process method.

2.8.2. Coffee Storage

Storage is one of the foremost crucial stages within the process of any agricultural goods reportable by Anwar [77]. Within the case of occasional storage, the goal is to realize and maintain its business worth as long as doable by protecting the integrity of the bean with all its characteristics. The necessity for adequate storage is crucial since coffee beans reside entities within which their viability depends mostly on storage conditions and food safety has currently become an especially vital issue since the results of noxious substances, which might develop throughout storage, will cause vital hurt to human health. In addition, though occasionally doesn't have an excellent nutritional value, its value relies on its sensory value.

This is often a fervent aspect, which might simply be affected if storage isn't adequate. Besides this, because of the inherent imbalance between offer and demand within the coffee market, it's generally necessary to store coffee for an extended time within which the length of storage affects the standard of coffee. Storage facilities ought to be clean, cool, shaded, dry, and well ventilated. In conditions of high ratio and temperatures, coffee beans can absorb wet and develop mold. They may be bleached move into color and lose some fascinating flavor. During this regard, the farmers within the study space are victimization poor storage facilities that result in changes in the inherent qualities and look of the inexperienced occasional as a result of the potential development of molds [78].

3. Conclusion

Ethiopia is the birthplace and genetic diversity hub for Arabica coffee. However, the quality of the coffee is deteriorating with time. However, the research revealed that this degradation is due to a variety of factors, including environmental and genetic factors, processing methods, and storage. It is important to consider the environmental

elements that have a significant impact on coffee quality (height, shade, daily temperature variations, rainfall volume, and distribution, as well as the physical-chemical properties of the soil). Soil also has a role to play in coffee quality. The pH scale of the soil was found to be related to the flavor and acidity of coffee indirectly. Soil also has a role to play in coffee quality. Except on commercial farms, most Ethiopian coffee producers do not use fertilizers. Because of the acidity and body of the brew, the appearance of inexperienced and grilled low beans was enhanced. Maturity, on the other hand, has a significant impact on coffee quality. Harvesting mature cherries and under-ripe cherries is not encouraged. Wet or dry methods are used to process coffee beans. Coffee is made utilizing a dry process (natural-sundried) technology in the majority of study rooms. In comparison to the dry process technique, further evaluations revealed that the wet process approach had higher permanent cup quality (attributes like acidity, body, and taste) and bean physical quality (attributes like odor). Clean, cold, shaded, dry, and properly ventilated storage facilities are also required. On the other hand, genetic origin (species and genotype), farmers' perceptions, and technological adaptation all have a significant impact on coffee quality.

4. Recommendation

As a recommendation, the subsequent small print is raised and considered. As a result, to overcome the challenges of producing high-quality occasional output in Ethiopia, it is more important to focus on the following analytical gaps:

- 1) To determine a clear link between altitudes, shade, and method methods components, a new study is required. Furthermore, due to the organic chemical makeup of the beans, there is a dearth of evidence on the influence of extremely high, mid-altitude, and low-altitude s on coffee quality.
- 2) Additional study is needed to overcome many variables such as general, environmental, and process techniques to improve quality and output.
- 3) In light of changing climate and agricultural techniques, further research into the effects of soil physical and chemical characteristics on the quality of coffee from diverse sources in Ethiopia is required.
- 4) It's critical to undertake further study on the impact of soil characteristics on coffee quality in major and small coffee-growing regions.
- 5) The impacts of shade in various coffee-growing locations need research into the relationships between shade and cup quality features on the environment.
- 6) The effects of shade in different coffee-growing locations necessitate the study of the relationships between shade and cup quality characteristics across environmental gradients (i.e. altitude) A half-dozen studies of coffee quality under various processing techniques are critical, as is giving training to farmers

to improve the quality, production, and productivity of coffee in the country.

- 7) The wet technique is more prominent than the dry method, according to seven different types of analysis. However, in our nation, the dry processing method is employed in addition to the processor. As a result, steps must be made to force the employment of the wet processing procedure.
- 8) The quality of coffee has also been impacted by the farmers' perceptions of technology and their adaptation to it. As a result, it's critical to provide diverse chances for producers to adopt alternative technology, as well as sufficient information for farmers to change their erroneous beliefs.
- 9) To overcome the intriguing quality of coffee, more study on the answer to every question is required.

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